Joint Data Support

JOINT DATA SUPPORT (JDS)

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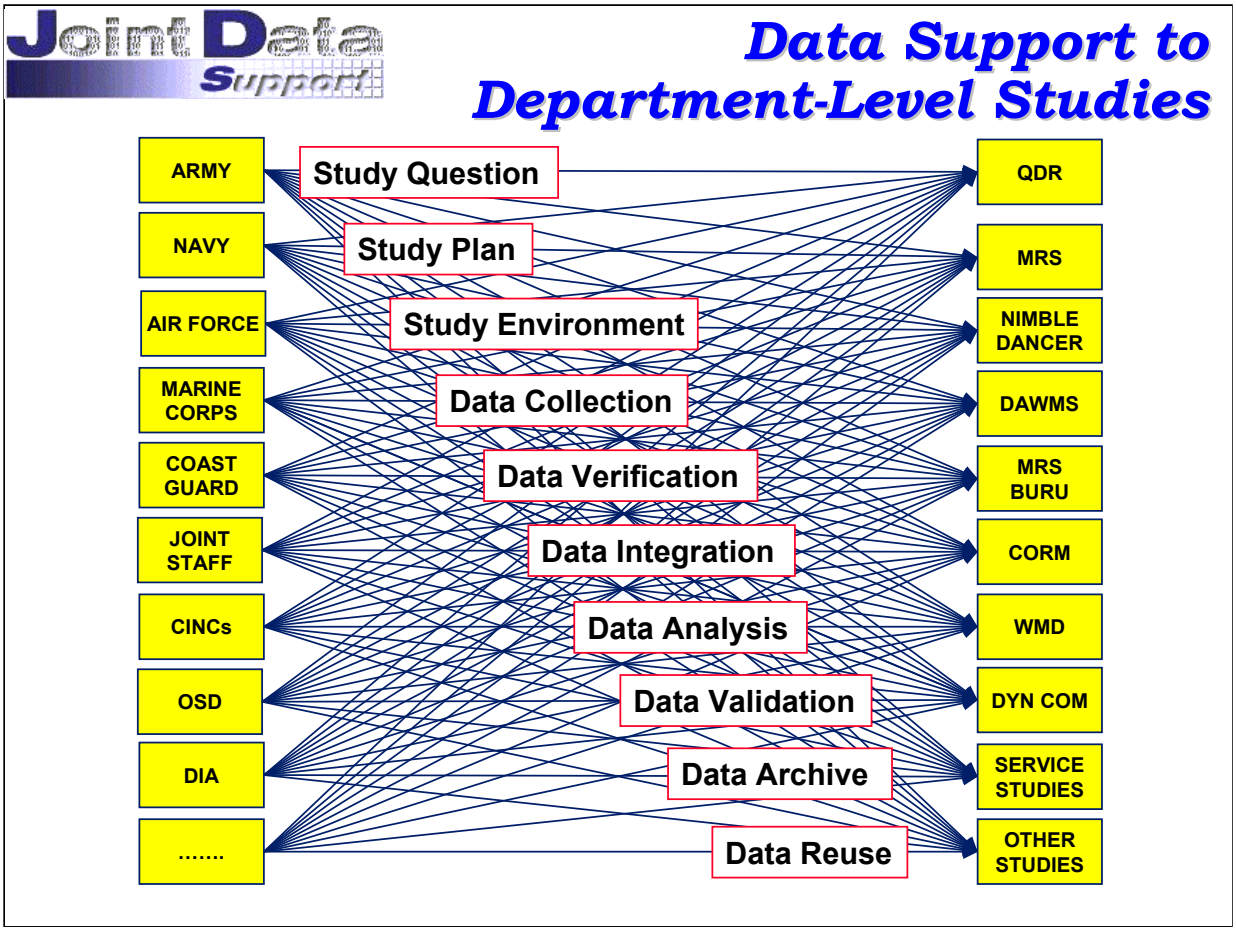
Joint Data Support

Agenda

- **Introduction**
- **JDS Process and Principles**
- **Example Activities**
- **Current Activities**
- **Discussion**

This annotated briefing will provide you with an overview of the JDS process and activities.



Historically, data development for joint or Department-level studies has been a complex, time consuming, and disorganized process at best. If done properly, transmitting data requirements and collecting data from source organizations could easily consume more time and effort than performing the analysis! Additionally, there was frequently no rigorous V&V performed, with the result that, at the end of the study, participants argued more about the validity of the data than about the analytical results and conclusions.

In 1995-96, the DepSecDef established the Joint Analytic Model Improvement Program (JAMIP). The two principal JAMIP components are JDS, which was intended to facilitate development and use of V&V'd data for DoD campaign studies; and the Joint Warfare System (JWARS), which was intended to provide new joint theater-level simulation for DoD campaign studies.

Department's Requirement

Active Participation in Study Planning
- ✧ Influence data development
- ✧ Facilitate definition of study requirements

Integrate Sources
- ✧ Connect within and across functional areas
- ✧ Allow comparison across databases

Scrub Data
- ✧ Fix errors
- ✧ Strong feedback loop to source provider
- ✧ Highlight "judgment calls" to study teams

Tailor Source Data to the Needs of the Study Teams
- ✧ Analyze and fuse appropriate sources for comprehensive view
- ✧ Format data product to specific application

Recognizing the difficulties involved in the data development process, JDS was established with the intent of meeting the requirements listed above and streamlining data production efforts for DoD studies using JAMIP models.

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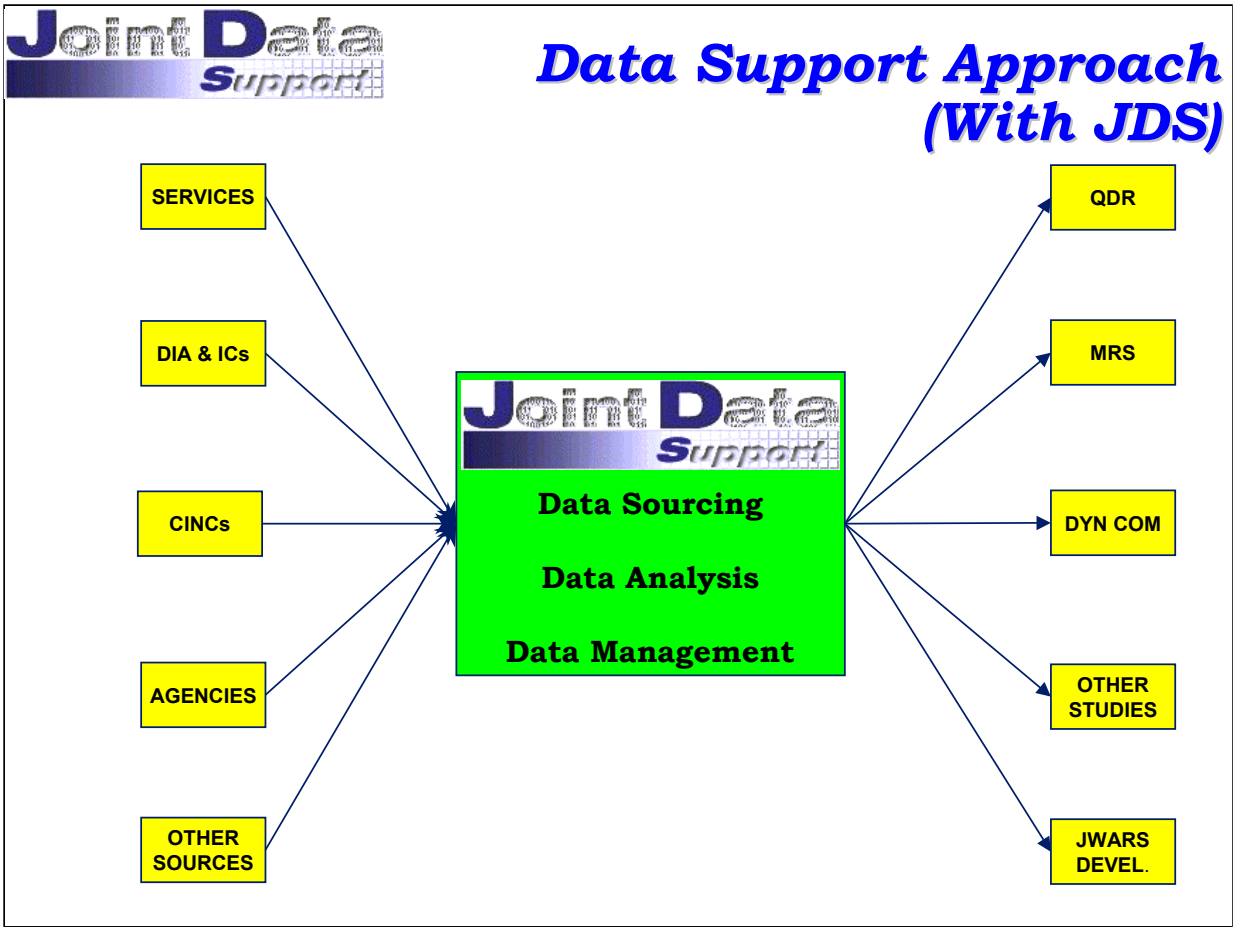
Charter

Improve the Quality and Consistency of DoD Analyses

- **Data Sourcing, Analysis, and Management for DoD Studies**
  - **Using JAMIP simulations (e.g., Mobility Requirements Study 2005 [MRS-05])**
  - **Using other decision support processes (e.g., Dynamic Commitment, QDR)**
- **Support Joint Warfare System (JWARS) Development and Fielding**

Broad customer base (Joint Staff, Services, CINCs, OSD)

In accordance with its charter, JDS attempts to improve DoD analytic efforts by focusing on data sourcing, analysis, and management. JDS has typically provided support for "JAMIP" models and simulations (discussed more on slide 9), but has also supported studies, such as Dynamic Commitment, which used other types of decision tools. During development of JWARS, JDS has provided experts to help developers design the model while adhering to the constraints of available data.



With JDS, the data development portion of a joint Department-level study becomes a more streamlined effort (when compared to the historical construct on slide 3).

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Background

- **JDS is a component of the Joint Analytic Model Improvement Program (JAMIP)**
- **Under PA&E administration -- Joint Staff funded**
- **Operates under strict releasability rules**
- **Personnel:**
  - Operational, intelligence, and combat support expertise
  - Database engineers, modelers, programmers, webmaster, system administrator
  - Operations Research Analysts

As mentioned, JDS is a key component of the JAMIP, which was approved by the Deputy Secretary of Defense in May of 1995. JDS is co-sponsored by OSD PA&E and the Joint Staff (J-8).

We operate under strict releasability rules to help prevent the inappropriate use of data.

We have experts in military operations, information technology, and analysis who work together to efficiently conduct data development for DoD studies.

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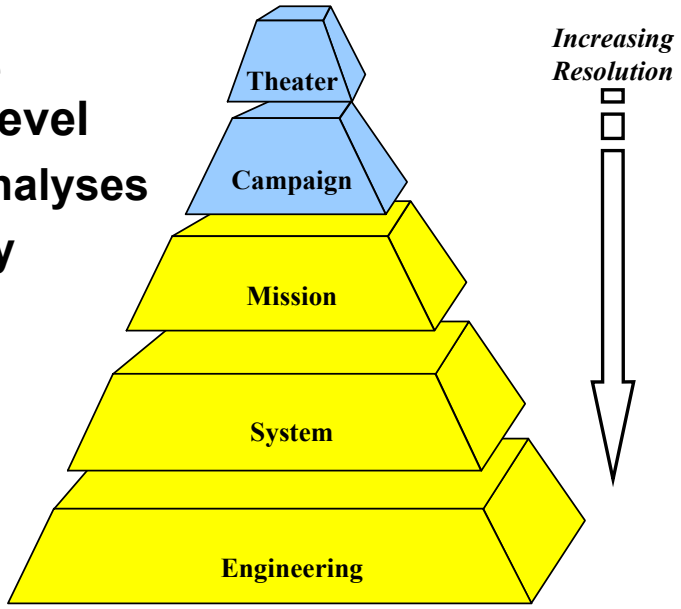
Modeling & Simulation Paradigm

JDS focuses at the *campaign/theater* level

- **Programmatic analyses**
- **Force sufficiency analyses**



The M&S "pyramid" in this slide shows the spectrum of military analysis. Starting at the top with the theater-level, analysis requires greater resolution as you go down to the engineering-level.

At the bottom of the pyramid, engineering-level analysis might include system component capabilities, such as aircraft sensors or artillery round fuzes. Next, at the system-level, analysis would include complete systems, such as aircraft or tanks. At the mission-level, we'd expect analysis of collections of systems performing missions, such as aircraft performing Close Air Support. At the campaign-level, the focus is on the ability of multiple units with air, ground, and/or maritime capabilities to accomplish operational objectives and tasks. Finally, theater-level analysis would most likely focus on the aggregated capabilities of numerous different forces carrying out strategic theater objectives and tasks.

Typically, JDS provides data for theater- or campaign-level analyses, at the top of the pyramid. Periodically, however, we have provided data for mission-level studies.

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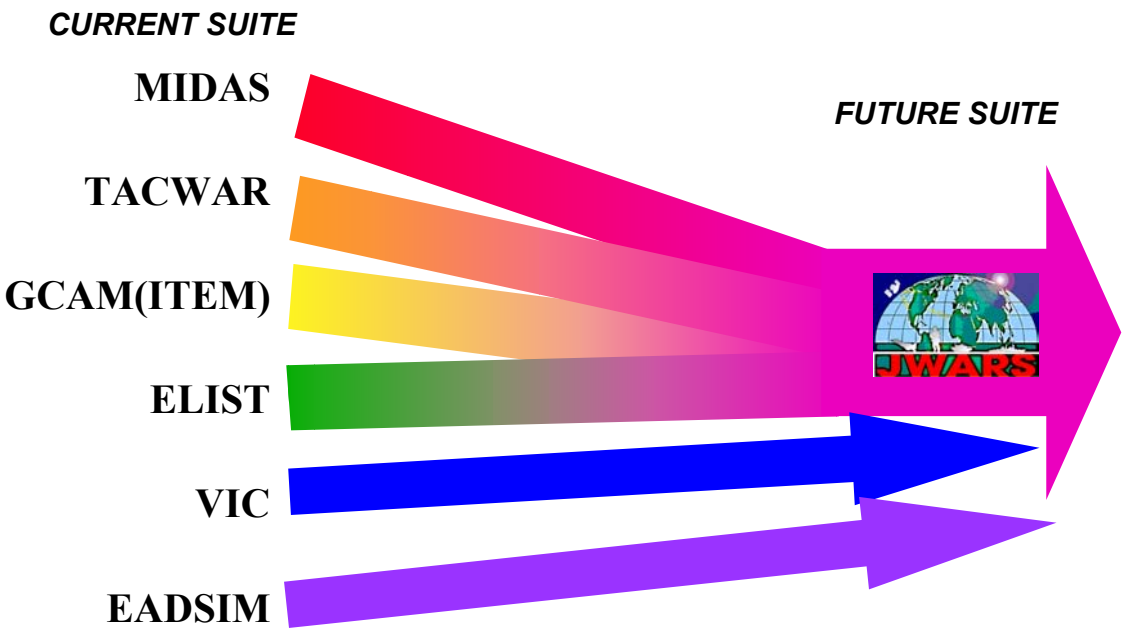
JAMIP Models



This slide shows the JAMIP models that we support. On occasion, we provide data for other models, simulations, and analytic processes, such as JICM and Dynamic Commitment.

As you can see by the diagram, the intent of the JWARS program is to ultimately replace many of the legacy systems. As JWARS approaches Initial Operational Capability (IOC), JDS has begun shifting resources to focus on production of JWARS data.

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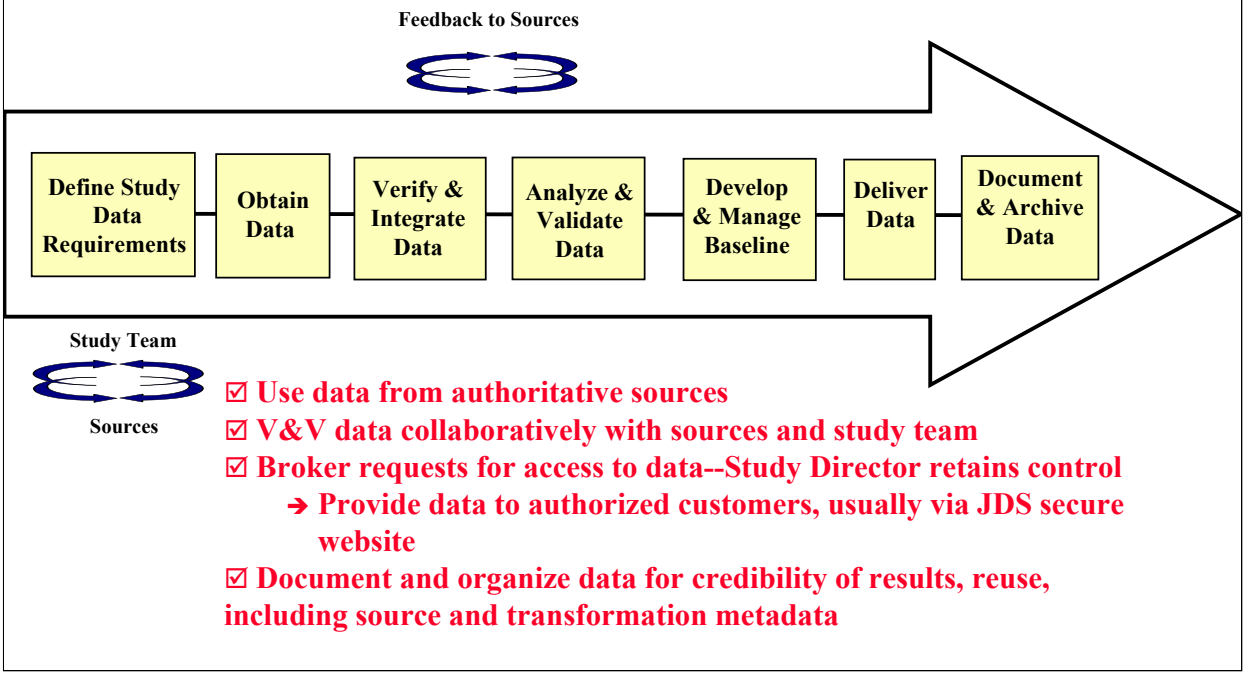
- Introduction
- **JDS Process and Principles**
- Example Activities
- Current Activities
- Discussion

Next, we'll discuss the JDS Study Support Process and some of our key principles for managing data issues.

Data Support for Studies Process Overview



JDS typically employs the seven step process shown above to provide verified and validated data for studies. At the discretion of the study director, JDS will tailor this process to suit the specific needs of a study. In all cases, data access and release rules will be established to protect the equities of data providers. To conserve scarce DoD resources, JDS promotes the re-use of data, but recognizes that controls on data release are necessary to ensure appropriate re-use of data.

For more information on our study support process, please see the document titled "Joint Data Support (JDS) Study Support Process" located on this website.

Joint Data Support

JDS Basic Principles for Supporting Studies

- Resolve data issues early in the study
- Adhere to formal data access and release procedures, while promoting appropriate re-use of data
- Document and archive key data products, transformations and study artifacts
- Provide easy access to data via secure, web-based tools

During study execution, JDS interests are to ensure data consistency and to capture underlying assumptions used in generating and using all types of data

Our basic principles help study teams focus on the analysis, while JDS resolves data issues. Data issues include problems such as identifying data sources, determining transformations and aggregations to be performed, verifying and validating the data, and controlling access to the data.

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JDS Process and Principles

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Next, we'll discuss some of our past data support activities.

Data Support for Selected Studies

Study	Types of Data	Sponsors/customers
Mobility Requirements Study (MRS-05)	Lift Requirements (TPFDD) Lift Assets, Infrastructure Warfight Data	OSD, Joint Staff, Services, TRANSCOM
Dynamic Commitment Beyond 2000 (DCB2K)	Forces Units Personnel Order of Battle	OSD, Joint Staff (J-8), Services, CINCs, others
Kosovo Data Collection	Collateral damage, BDA, sortie effectiveness, various briefings & documents	OSD, Joint Staff (J-8)
DoD Contingency Operations Database	Archive for DoD operational activity data	OSD, Joint Staff, Services

JDS has supported many studies since its inception. This slide shows a few diverse examples. MRS-05 consisted of mobility analysis for two nearly simultaneous Major Theater Wars (MTWs). In MRS-05, campaign analysis occurred iteratively with the mobility analysis to determine the impact on the campaigns of various lift options. DCB2K assessed the force structure implications of numerous Small Scale Contingencies and MTWs. The Kosovo Data Collection occurred after Operation Noble Anvil in order to collect as many relevant data artifacts as possible. Finally, the Contingency Operations Database project involved collection of data and implementation of a database to capture the US forces committed to contingencies over the past decade.

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Next, we'll discuss current JDS activities.

Joint Data Support

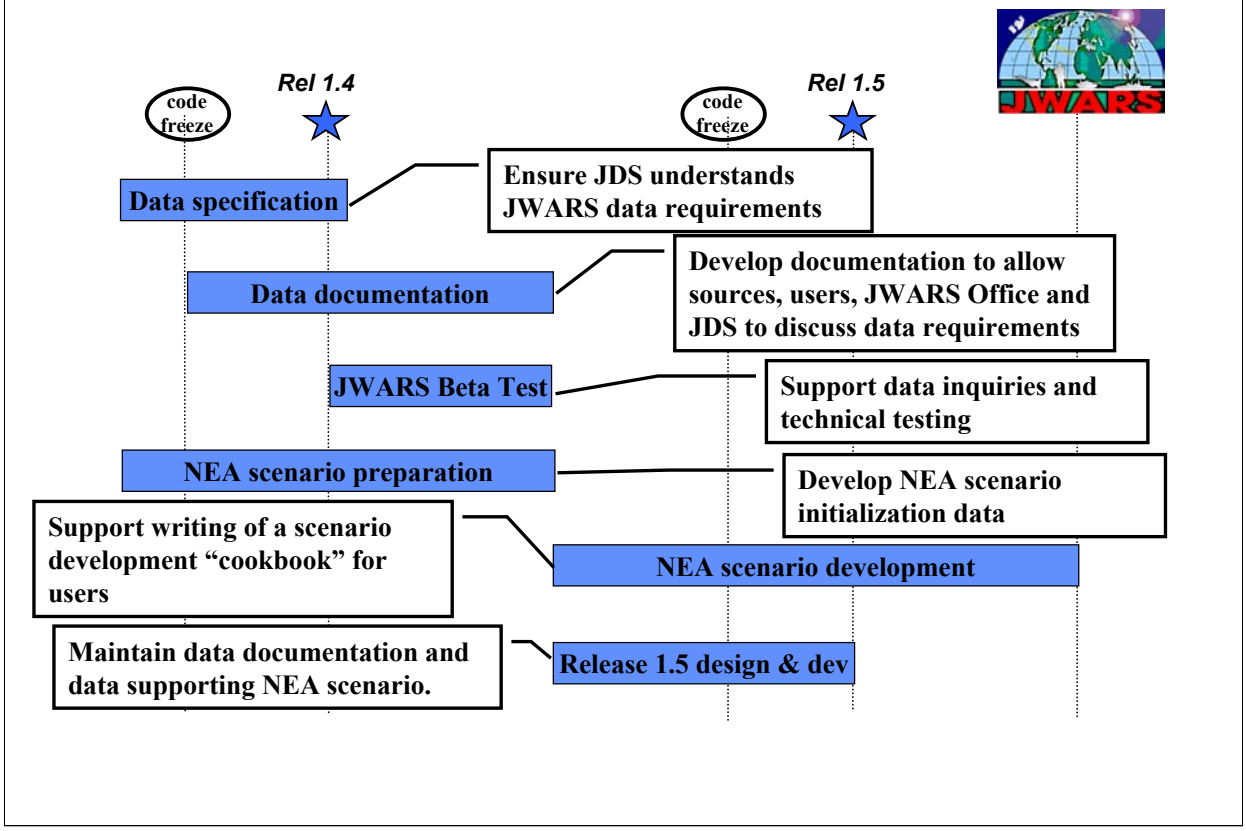
Conventional Forces Database (CFDB)

- **Description**
  - Provides a U.S. forces integrated data set
  - Consists of current year data for all U.S. Services (including National Guard and Reserves) and Coast Guard within three data categories:
    - Units (functions, home station locations, and readiness)
    - Equipment (unit assignments)
    - Personnel (occupation and rank)
- **Current status**
  - Currently released on semi-annual cycle, next release May-Jun 02
  - 55 DoD-wide customers and growing
    - Focus on configuration management
  - MOU with J-8 regarding Force Employment Database (FEDB)
- **Plan**
  - Enhance CFDB tool box (add Joint Force query capability)
  - Document CFDB development process
  - Integrate CFDB with JDS data factory
  - Link CFDB with Order of Battle development tools
  - Research need for other versions of CFDB (outyear US and Non US Forces)

The CFDB is a classified US forces database for the current year that we update semi-annually. Our plan is to continue to enhance this database, provide more documentation, and integrate it with other data production efforts. Over 50 DoD customers receive CFDB and use it for various purposes. We are interested in understanding the uses in order to improve the CFDB product and understand the impact of CFDB configuration changes on users.

We are also developing a similar product for non-U.S. forces, units and equipment, tentatively named the “Foreign Forces Database” (FFDB).

JDS Support to JWARS



JDS has been supporting JWARS development since JDS was established. This slide shows our current focus on JWARS data specification and documentation. After Release 1.4 occurs we will also support Beta Testing. As we approach Release 1.5, JDS will support production of a scenario "cookbook" which will be a step-by-step manual on how to build a scenario for studies using JWARS. Finally, a completed North East Asia (NEA) scenario for JWARS is an intended by-product of the scenario "cookbook" project.

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C4ISR Data Support

- **Description**
  - Develop Threat/Sensor and Communications DBs
  - Conduct research into C4ISR data support to studies and analyses
- **Current status**
  - JWARS users are the intended customers – for now
  - Identifying data sources
  - Developing process to obtain, process and provide C4ISR data
  - Challenges exist – C4ISR interaction with combat systems, SCI source data
- **Plan**
  - Complete initial C4ISR database development
  - Formalize working relationships with authoritative sources
  - Test the database and process during JWARS NEA scenario development

C4ISR data continues to be a challenge for DoD analytic efforts. JDS is conducting research in this area and beginning to develop associated databases. The current focus of this effort is to support JWARS.

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JDS Data Factory Development

Description

- Program to enhance JDS data management
- Obtaining, processing, developing, maintaining, disseminating, and archiving data

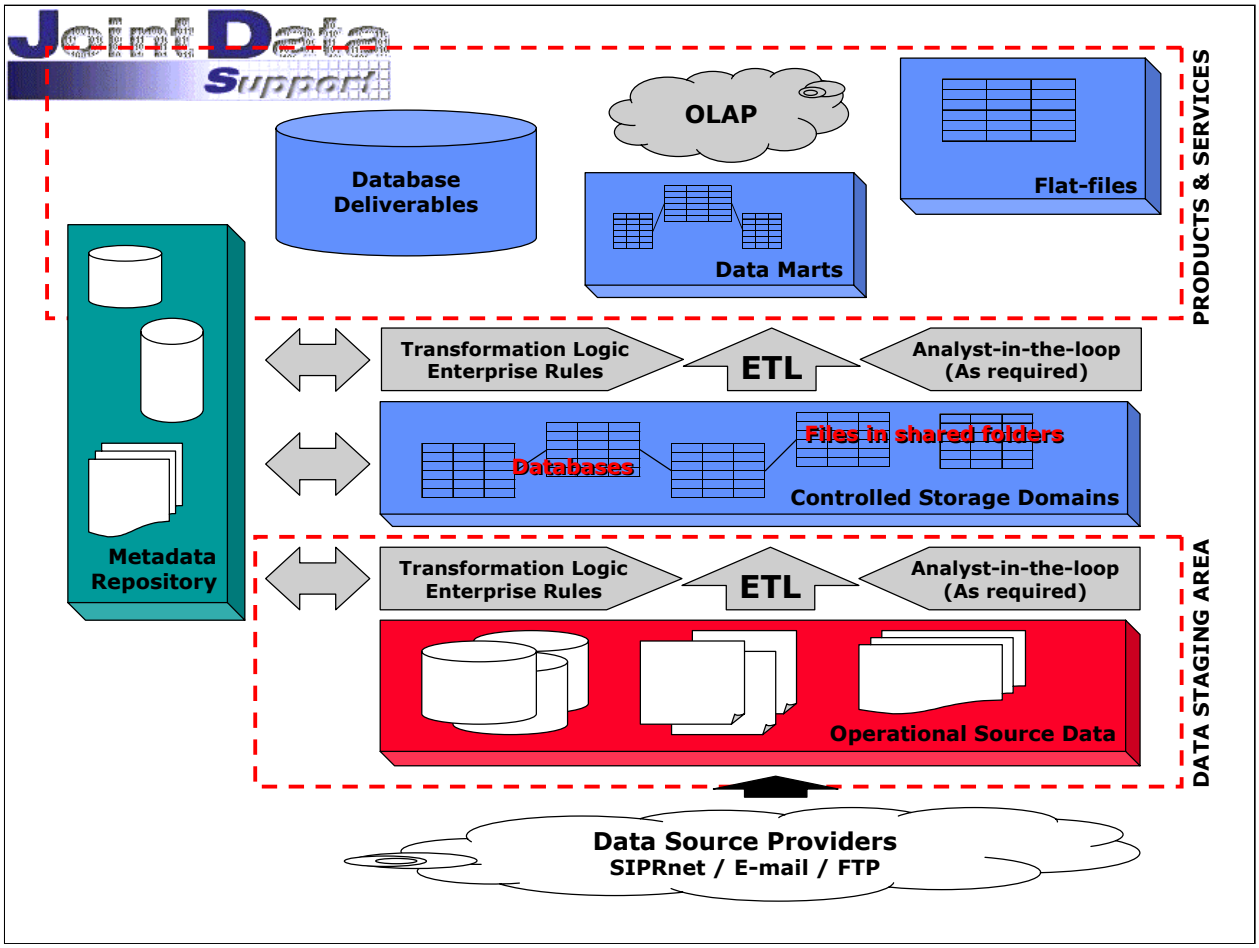
Current status

- Recent and Ongoing Initiatives:
  - Data Discovery
  - Revised Data Storage Architecture - proposed
  - Search Engine Technology - prototyped
  - Metadata Study

Plan

- Migrate selected initiatives to the JDS data management environment, consistent with current priorities
- Standardize associated processes with written policy
- Impose minimal impact on current operations

JDS continues to refine and enhance its own internal processes associated with data management and constantly works toward establishing working relationships with new data providers.



This structure represents the various layers that JDS uses in its architecture for data storage, manipulation, and presentation of data. JDS follows a structured process and storage architecture for the receipt, cleansing and (if appropriate) integration of data.

Source data is received, archived, and placed in the data staging area. Data follows a structured extraction, transformation and loading (ETL) process prior to loading into the controlled storage domain; domain/analyst-in-the-loop is used as required. The data in the controlled storage domains (whether flat-files, in RDBMS, or in spreadsheets) have been processed in certain ways, such as validated or cleansed.

As product-based requirements are determined (e.g., JWARS import/export tables), ETL routines are developed to bring data from storage domain to product domains. These products can take the form of web-based tools, one-time extracts, spreadsheets, etc.

One of the fundamental principals of JDS is that Metadata is collected on every applicable stage of data management, hence the metadata repository being integrated in the above architecture.

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JDS Process and Principles

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Last, we will discuss relevant issues.

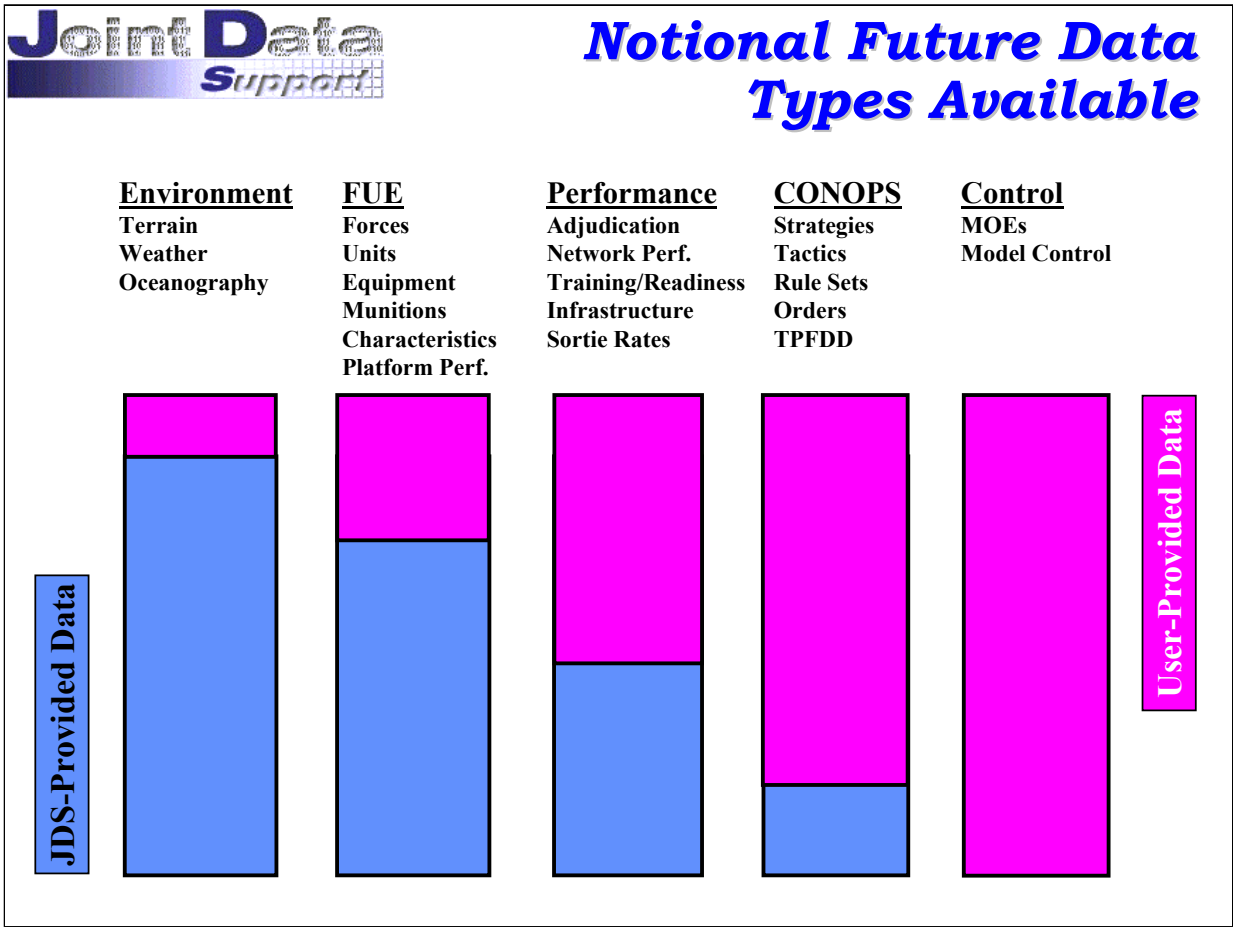
Joint Data Support

Key JDS Challenges

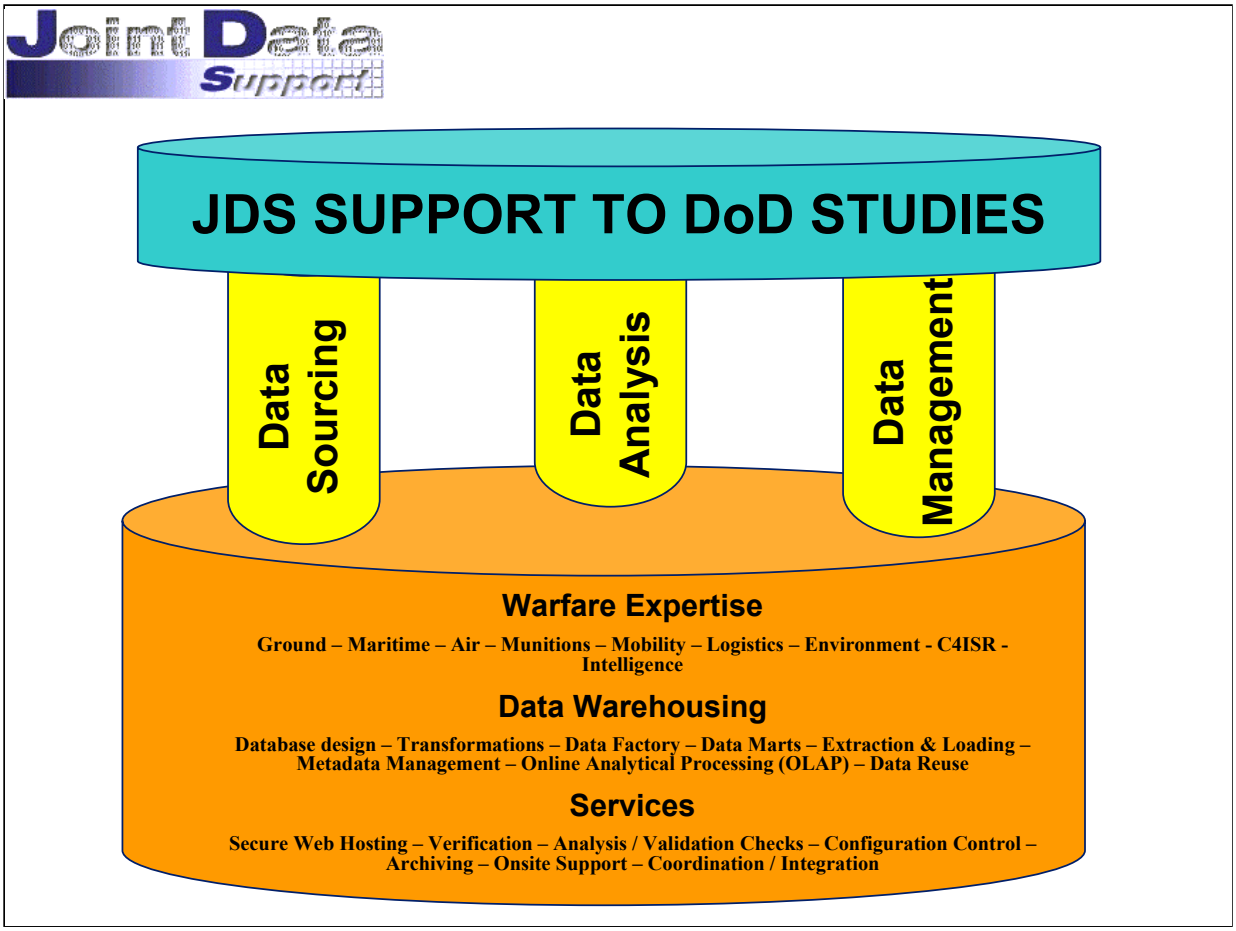
- **Lead time for data development**
  - Identify required scenarios and functional areas
  - Performance data (e.g., attrition)
- **Disconnects/inconsistencies across**
  - Services: sortie rates, target set, etc.
  - Functional domains: TPFDD vs. warfight, etc.
  - Models

Although we've streamlined the processes, data collection, transformation, verification, and validation will always require an appropriate amount of time to accomplish correctly. For major DoD analytic scenarios, such as those in the Defense Planning Guidance, JDS will strive to streamline the process further by gathering readily available data and fostering working relationships with the key data providers. Working with the study team and data providers, we will also strive to work out any inconsistencies that we find in the data during our V&V efforts.

Notional Future Data Types Available



The slide above is a representative break-out of the types of data used in joint Department-level study. The JDS objective is to expand the levels of "JDS-provided data". As we develop expertise obtaining the more readily available data types, we intend to expand our capabilities toward collecting and providing the more difficult-to-obtain data types.



JDS combines military expertise with information technology (IT) to provide data services in support of DoD studies. Our military experts have points of contact within the Services and in the intelligence community to acquire the latest data related to forces, units, and equipment. Our IT professionals assist in areas such as database design, programming, and web hosting.

In summary, JDS integrates experts from multiple disciplines to provide study teams, DoD-wide, with data sourcing, analysis, and management capabilities.